AMENDMENTS

In The Specification:

Please amend the following paragraphs as follows:

[0004] As the semiconductor industry advances into the deep sub-micron generation, the active area isolation structure in a device under 0.18□μm is usually formed utilizing a shallow trench isolation (STI) process. In an STI process, a shallow trench is formed first on a substrate, and then a chemical vapor deposition (CVD) process is performed to fill up the shallow trench with silicon oxide. Since a sub-micron device generally has shallow trenches of a high aspect ratio (AR), high-density-plasma chemical vapor deposition (HDP-CVD) methods are usually used for silicon oxide deposition. In an HDP-CVD process, deposition gases and sputtering-etching gases, such as inert gases like argon and helium, are simultaneously used to perform deposition and sputtering-etching at the same time, so that voids will not be formed in the silicon oxide layer filled into the trench.

[0006] Another method for solving the overhang problem is to change the species and percentage of the sputtering-etching gas. When the aspect ratio of the trench is lower than 3 in a process above 0.18□μm, the sputtering-etching gas is usually argon, and has a percentage of 30~60%. While the process linewidth is scaled down to 0.13□μm and the aspect ratio of the trench is raised to above 3 correspondingly, lighter helium is used in replacement of argon, and the percentage of helium is reduced to under 13% to inhibit the redeposition effect.

[0019] Referring to FIG. 3, a substrate 300 having a trench 310 formed thereon is provided, wherein the substrate 300 is constituted of a silicon substrate and a mask layer thereon, for example, and the trench 310 may be a trench of a STI structure. For a STI structure formed in a semiconductor process under 0.13□μm, the aspect ratio of the trench 310 is usually higher than 3. For a STI structure formed in a 90nm semiconductor process, the aspect ratio of the trench 310 is usually 4 or higher, and the width of the trench 310 is about 130-140nm.

[0024] Since the addition of hydrogen in the HDP-CVD process of the preferred embodiment of this invention can inhibit the redeposition effect and formation of overhangs, this invention is particularly suitable for a gap-filling process of high aspect ratio. Meanwhile, the ED ratio of the HDP-CVD process in the preferred embodiment of this invention can be adjusted down to 0.1-0.03 from 0.2 or more in the prior art, so as to prevent correlating problems like corner clipping. Moreover, the gap-filling process of this invention can be completed within a single step without changing process parameters, so the method of this invention is much simpler than those in the prior art. Furthermore, because hydrogen can inhibit formation of overhangs, the HDP-CVD gap-filling process of a semiconductor process of a smaller linewidth (e.g., 90nm) can be performed in an HDP-CVD machine originally provided for a semiconductor process of a larger linewidth (e.g., 0.13□μm). Consequently, the cost for upgrading the manufacturing equipment can be saved.